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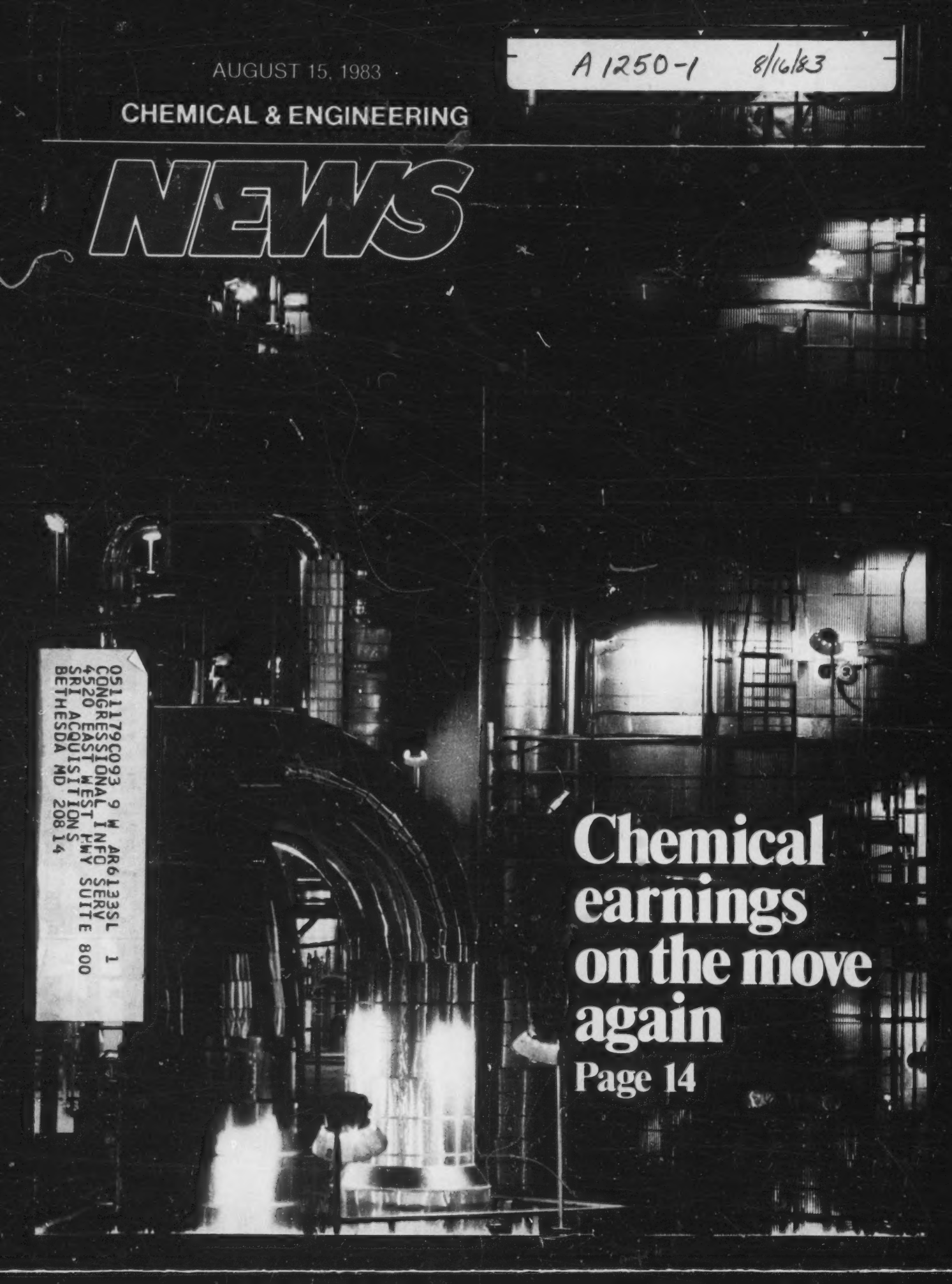
AUGUST 15, 1983

CHEMICAL & ENGINEERING

# NEWS



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## Chemical earnings on the move again

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*Cover:* Monsanto's new maleic anhydride plant at Pensacola, Fla.

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CHEMICAL & ENGINEERING NEWS

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## News of the Week

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# Developing Countries: Challenge for Chemists, Economists

## Deepening crises in global economics are forcing economists to draw on other fields of knowledge, such as chemistry, to help form their policy decisions

**Wil Lepkowski,** C&EN Washington

At the American Chemical Society's national meeting in Washington, D.C., later this month, a small group of ACS leaders will be getting together to chart new ways chemists can help developing countries solve their massive economic development problems. As University of Detroit chemist H. Harry Szmant says, "Chemistry is the only science devoted to transforming matter into useful products. It is the obvious means of bringing intellectual power to bear on satisfying the needs of society."

Szmant, who also heads the university's International Institute for Development through Chemistry, has been pressing for a closer integration of chemistry with economic development planning through 30 years of research and teaching in Latin America. But according to Szmant, economists don't appreciate how science and technology are changing the physical and cultural world. For if they did, they would insist in their policy advice on ways of supporting projects and programs that more directly meet the needs of human beings.

Nor, he feels, is economic thinking much of a factor with scientists and engineers in their plans to apply research and technology to developing countries. They think little of cost, price, feasibility, or cultural impact. It is as though both fields of thought pass each other in the night, even though neoclassical economics owes its foundation to mechanical concepts and metaphors founded on 19th century thermodynamics, a fact forgotten by almost everyone who writes about economics, yet a fact crucial to understanding why economists think in the mechanical ways they do.

C&EN staff photos

*Urquidi: economics is inadequate*

Few people have much faith in economists these days. But that hardly means economics is irrelevant. Economic advice controls policy. And since economists give policy advice, their views of the world are indeed important especially if it is science and technology that are the key elements in global change. Indeed, as one wag says, economists themselves are defying the market laws they expound. The worse their performance, the more they are in demand.

Fortunately, there is a growing tide of unrest within the economics profession itself over these matters. The concerns began with the realization that most economic forecasts made after oil prices rose with the 1973 Arab oil embargo turned out wrong. Now that oil prices may well be fluctuating over coming years, the profession is even more disturbed. Inflation and unemployment spin out of control in one country. Interest rates soar in another. Exchange rates fluctuate dizzily. Meanwhile, agricultural development declines in precisely those countries that need it for basic survival.

Then there is the $600 billion debt owed to western banks and international lending institutions. Brazil owes $90 billion, Mexico $83 billion, Venezuela $32 billion, Chile (a country with a population of only 11 million) $22 billion. All these countries borrowed on the presumption that their economies would grow through exports of their commodities and manufactured goods. But nothing of the sort hap-

## IFIAS plots research program assessing relevance of economic theory to world changes

Part I. The Relevance of Economic Theory to Policy.

A series of commissioned papers on such topics as the role of non-economic factors in environment; security, ideology, and science as factors in economic policy; the usefulness of short-term economic policies as practiced by the developed countries; prospects for cooperation between developing countries; and relations of the communist economies to those of developing countries.

Part II. Selected Areas of Socio-Economic Transformation:

1. Toward a Socio-Economic Theory of Technological Change. What are the long-run impacts of high technology on society, including the continuing mechanization of agriculture? How has the rise of transnational corporations affected consumption patterns around the world? Do the transnationals really boost the economic and social well-being of the host countries?

2. Using the Human Resource: Labor Costs and Emerging Patterns of Occupation. Full employment now may be an unachievable myth in industrial countries. Will there emerge new patterns of occupation such as shortened workweeks, earlier retirement, or later entrance into the job market, or temporary opportunities to withdraw from the labor force? Do macroeconomic policies such as monetary and fiscal measures deal adequately with the long-term problems of unemployment in Europe and other industrial countries?

3. Adjustment to the Changing International Division of Industry. New industries are spreading all over the world, sparking sharp changes in the global "division of industry." One result is the upsetting of trading rules and confusing the meaning of comparative advantage. Traditional theories of trade thus should be re-examined to broaden their range of application. To what degree, now, is knowledge a factor in trade flows? Labor and capital no longer seem the primary determinants. Other factors besides labor costs appear now to be determining in what country goods are produced. Finally, what will happen when the oil-producing countries become exporters of products of large, capital-intensive products?

4. Development strategies: Critical Review and Alternatives. Development theories applied over the past decades seem to have failed. Import substitution, fluctuating terms of trade, and land reform as bases of these theories no longer seem to be valid as development strategies. Should new development theories be based on such practical domestic policies as reforestation, conservation, and new technologies? What are other alternatives?

5. New Global Interactions Among the Developing and Centrally Planned Economies. Should trade be expanded among developing countries? Should they give preferential treatment to each other's products? What would be the political obstacles to a customs union?

6. Peoples' Access to Food. With farm productivity increasing in the North and population soaring in the South, present patterns of agricultural trade are certain to intensify. Is this pattern socially desirable? Will local production be inhibited? Would risks of famine be enhanced? To what extent is lack of agriculture in some southern countries caused by counterproductive economic and social policies?

pened. The global economy fell into recession. Much of the lent money went into real estate investments by the upper classes, or into consumer loans for members of the lower class, who promptly lost their jobs and became personally bankrupt. Meanwhile, the poor in each of the countries got poorer. Chile, which adopted a free market policy based on the Chicago school of conservative economics expounded by Nobelist Milton Friedman, went into a severe tailspin beginning in 1981.

The roots of all these problems may have nothing to do with economics as it is practiced as a theoretical field. But dismissing the social responsibilities of economists could well be an intellectual cop-out. The central banks and the International Monetary Fund in Washington have to accept much of the blame for the current global crisis. Economic advisers cannot escape blame when they see Venezuela's agricultural college virtually boarded up while the country experiences food shortages and expensive food imports.

The concern basically is that macroeconomic theories often bear no relation to the realities of human behavior, or to sustaining the world's natural life support system, or caring about the quality of village life. Without a rethinking of economic theory through a more thorough integration with technical change, the advice that economists give to governments, industry, and consumers could well continue to spin the world toward deeper crises.

The chore, then, is twofold: first, for science to be a more significant part of economic planning. Second, for economists to draw on other fields of knowledge to improve the basis for their policy decisions.

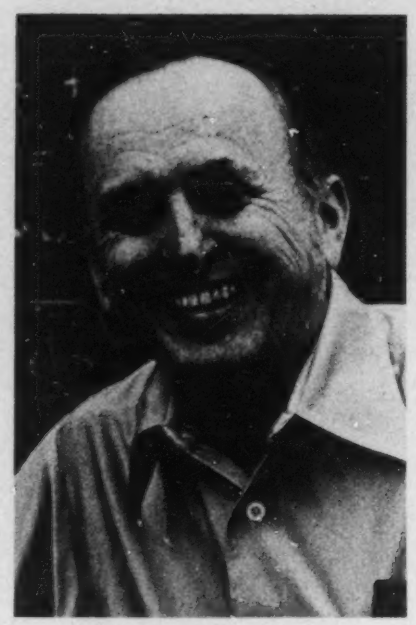
In June, an unusual meeting was held at the Rockefeller estate at Pocantico Hills near Tarrytown, N.Y., expressly to deal with these issues. The meeting called together members of the International Federation of Institutes of Advanced Study. Its theme was laid out in a basic issues paper by Victor L. Urquidi, a former chemist but now an economist and president of El Colegio de Mexico. In it he asked, "Why is economics as practiced today in different kinds of societies so inadequate in response to prospects and visions of the future held by people at large? Large numbers of economies are undergoing deep crises. The crises can be characterized as not only economic but social and political. The sum of all the crises adds up to a serious global crisis to a degree not experienced before in modern times."

Then he asked: "Is traditional economics relevant? Most western economists carry out their research on conditions in the highly industrialized countries, and assume the findings are applicable to developing countries. Most economists in general tend to favor

'general equilibrium' analysis—disturbances in the system that can be corrected through the market or otherwise. Everything bounces back sooner or later, back into balance."

But everything doesn't bounce back into balance. And that being so, Urquidi claims that most of his fellow economists have been impervious to the impact of technological change on society, and frequently have assumed that technology—even the massive amount spent on weapons technology—is developed as a result of "market forces." The developing countries especially find themselves at a particular disadvantage, he says, in that their economic resources are too small to invest in the innovations they need.

After a week of hashing out such issues as the global food supply, overpopulation, ecological problems, the impact of automation on jobs around the world, the threat of protectionism, and sundry other issues, they went home to their respective research centers to think about their research agenda. Late last month, the agenda was released.



*Zajak: more interaction now*

What economists can agree on now is that the world is increasingly, probably irretrievably, interdependent. Money, technology, and the "transnationalization" of industry with its enormous impact on management, transfer of technology and information across borders, and the changes that affect traditional cultures and economies have made it so. And it has been that interdependency that ironically has widened the gap between the rich and poor countries.

"Interdependency is a wonderful word and a marvelous sentiment," says Howard Perlmutter of the University of Pennsylvania's Wharton School of Economics. "But being interdependent with 159 other nations is also turbulent, confusing, and very disturbing. You can't export the same things to each other. There already are 32 million unemployed people currently in industrial countries. With computers and robotics, why do we think we'll need more people for that kind of work? The factory of the future, the office of the future, are really less people-intensive." Perlmutter made his remarks in a panel discussion produced by author, lecturer, and economic critic Hazel Henderson, prepared for public television on WUFT in Gainesville, Fla., as part of a new series entitled "Creating Alternative Futures."

The international chemical community is finding itself moving into the thick of these debates over economic values, too. The International Union of Pure & Applied Chemistry has established a series of conferences known as CHEMRAWN, or Chemical Research Applied to World Needs. And two years ago, the United Nations Educational, Social & Cultural Organization established the International Organization for Chemical Sciences in Development. Its president is chemist Glenn T. Seaborg of the University of California, Berkeley (C&EN, Jan. 3, page 21).

One of IOCSD's goals is to help the developing countries establish small-scale chemically related industries, no small economic undertaking. Seaborg says the organization, now involving hundreds of academics and industrialists all over the world, hasn't yet integrated macro- and microeconomic thinking into its plans. "We're still a small, undermanned, underfunded organization," he says, "but it's something we'll have to get around to."

CHEMRAWN's first conference, meanwhile, was held in Toronto in 1981 on finding organic substitutes for petroleum. The second was held at the end of last year in Manila on world food supplies, and its report was issued late last month (C&EN, Aug. 1, page 4).

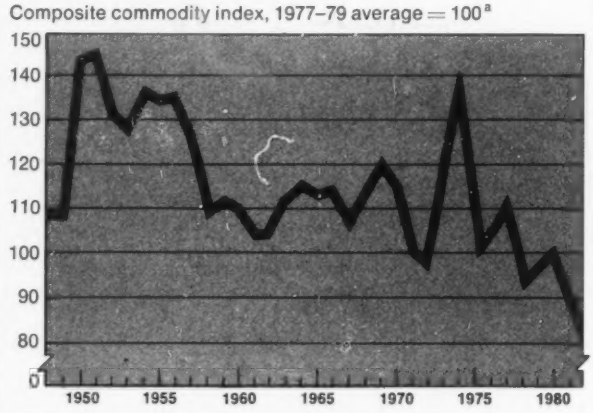
CHEMRAWN, through continuing followup of past meetings and through the planning of future meetings, undoubtedly will be a powerful force in pulling together into one network the world chemical community into economic development dilemmas. But much will depend on the speed with which the economic implications of chemical knowledge pervade economic thinking, and vice versa. This, at least, is what Louis G. Nickell, vice president for R&D at Velsicol Chemical Co., believes. Nickell is on the future actions committee of CHEMRAWN II and has intimate knowledge of the problems of development in developing countries. He agrees that such things as social and technical changes have to be incorporated into any discussion of technology transfer into the economies of developing countries.

"I think it would be a good idea for a followup CHEMRAWN conference to discuss these issues and get a good dialogue going between chemists and economists," Szmant says. "What we technical people need to do is ask them the right questions, such as how we're going to do what we want to do, how much it will cost, and at what social cost. We don't ask those questions enough. But we'd not want just theoretical economists. We'd want ones who can visualize the consequences of each project, then determine the various costs."

Chemist Cyril Ponnamperuma of the University of Maryland, a native of Sri Lanka but now a U.S. citizen, is cochairman of the future actions committee of CHEMRAWN II. He agrees with Nickell that a deeper dialogue with development economists is a logical next step. But he would go a step further and consider the cultural aspects of technical change. Economists would need that data, too. "Who would have thought that the current issue disrupting my country would be linguistic? [Riots over language policies] recently flared in Sri Lanka between mobs of majority Sinhalese and the Tamils, of Indian origin.

## Developing countries face worsening export, debt problems

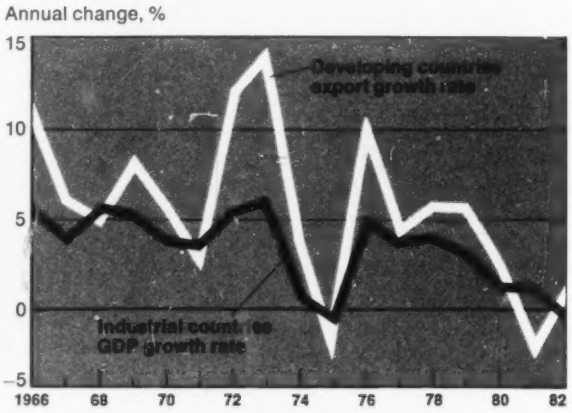
### Prices of commodity exports have fallen severely




a The graph shows nonoil commodity prices adjusted for the price of manufactures imported by developing countries. The commodities are coffee, cocoa, tea, maize, rice, wheat, sorghum, soybeans, groundnuts, palm oil, coconut oil, copra, groundnut oil, soybean meal, sugar, beef, bananas, oranges, cotton, jute, rubber, tobacco, logs, copper, tin, nickel, bauxite, aluminum, iron ore, manganese ore, lead, zinc, and phosphate rock.

Commodity exports are the lifeblood of developing countries' economies. Yet, commodity prices have fallen to only 80% of the 1977–79 average. This speaks for the need for developing countries to manufacture more value-added products of these commodities. But the richer countries might not import these products

### Export volume growth is declining with GDP growth of industrial nations




**Sources:** World Development Report 1983, World Bank

The growth of all exports from the developing countries has gone down steadily since 1976, along with the gross domestic product for the industrial countries. The graph shows how the rises in industrial country growth rates produce corresponding rises in developing country exports. No one knows what will happen when the developing and industrial countries compete more and more for the same products. Perhaps developing countries should not industrialize along the same patterns as the industrial world, but rather choose a different pattern of technology

### Ratios of debt service obligations to exports have soared

Debt service obligations are the most daunting problems facing developing nations, because these bear direct connections to their dependency on industrial countries' financial systems. Debt service obligation ratio is the proportion of the amount of interest that developing countries must pay to lending institutions to ... of their exports. That means that in the case of Latin American countries, 53% of their export earnings goes simply to payment of interest on their loans. The principal may never be repaid

| Country group | 1970 | 1980 | 1981 | 1982 |
|---|---|---|---|---|
| **ALL DEVELOPING COUNTRIES** | **13.5** | **13.6** | **16.3** | **20.7** |
| **Low income** | | | | |
| Asia | 13.3 | 7.9 | 8.4 | 10.1 |
| Africa | 6.5 | 8.8 | 11.6 | 28.3 |
| **Middle income** | | | | |
| Oil importers | 14.0 | 14.9 | 18.0 | 23.0 |
| East Asia | 6.7 | 7.0 | 7.6 | 8.6 |
| Latin America | 13.0 | 33.3 | 39.6 | 53.2 |
| Oil exporters | 13.9 | 13.0 | 15.7 | 19.1 |

Ponnamperuma feels the rich North and the poor South are continuing to move apart economically and he sees little way out. Even the development of something called the winged bean plant as a substitute for soybeans would cause economic or at least political disruption in Brazil and the U.S., big exporters of soybeans. But Ponnamperuma believes that the enormous potential of high technology can be wed to village economics.

"So much can be done," he says. "These countries can leap into the 20th century." But the problem, he acknowledges, is that these developments are geared toward a better balanced village life, not toward lifting whole countries out of their massive debts and general agricultural inertia. It means little to International Monetary Fund economists that a country's people are well fed and housed on localized farming, fishing, and thatch construction. Those activities add almost nothing to the gross domestic product of the country. Thus, IMF's macroeconomists virtually ignore the local human welfare issues. But it is those issues that lead most to social unrest and longer-term economic problems.

Albert C. Zettlemoyer, recently retired from Lehigh University, and a former president of the American Chemical Society, just returned from Nairobi, Kenya, where he attended the Second International Chemistry Congress in Africa. But again, Zettlemoyer observed that no discussions were held on the economics of applying

## Detroit's Szmant: chemists must get involved with developing countries' economic problems

*One chemist who has wrestled with the problems of development since the 1950s is H. Harry Szmant, chairman of the chemistry department at the University of Detroit. A physical organic chemist, Szmant has done research and taught throughout Latin America, beginning with Cuba, extending through Puerto Rico and Venezuela, and these days involving Chile and Brazil. Recently he shared some of his observations with C&EN.*

**C&EN: After all your years of trying to insert better chemical thinking into development problems in Latin America, what are some of your conclusions as to the role of chemists and their engineering in those challenges?**

**Szmant:** I think the potential role of the chemical community is tremendous, because in view of the lack of recognition for chemical science and technology, chemists must get involved in solving the fundamental problems of economic production and productivity of developing countries.

Since the chemical science and technology input isn't so strong, someone has to get up and make these things clear. Who but the chemical community? I come from an industrial chemistry background and so I believe that until we have a reservoir of human resources that are programed in the educational experience to think in terms of economic development, all the jetting around the world to talk about research is mere window dressing.

**C&EN: Can you give an example of the problems you talk about through a specific country?**

**Szmant:** Let's take Chile. Chile is a highly civilized, Europe-oriented country with more than 95% literacy. It has the highest per capita concentration of Ph.D. chemists of any Latin American country. Against that, Chile imports millions of dollars of goods that by all rhyme or reason should be made in Chile itself. It is the second largest provider of timber on the continent, yet it imports things like lignin derivatives, and so on. This simply proves that much of what's going on in Chile has little relevance to the problems the country has as a whole. Chile will remain undeveloped until agriculture, forestry, and other fundamental sectors get technified. And who is going to technify them? Some economist from the World Bank? All they do is give money. We have to provide the intellectual resources.

**C&EN: Didn't Chile attempt a major free market experiment that seemed successful for a while?**

**Szmant:** We know what happened to that experiment. I sent Milton Friedman, the University of Chicago economist who was the godfather of that policy, a letter trying to describe the importance of the chemical sector to the economy. In his reply, he said there was no such thing as a key industry like chemistry. He said the chemical industry's importance was shared appropriately by its share in the GNP, just as the importance of other economic activity is measured likewise.

What's wrong with that? I'll tell you. Let's say beauty shops and physical fitness establishments made up a pro-

the ideas at the meeting. "The business of the distribution of knowledge was never addressed," he says, although the scientific content of the meeting was more than adequate. "There was a lot of lack of understanding there on those matters."

He believes chemists involved in discussions on technology and development know enough about economics to discuss costs and benefits, but that economists need a deeper understanding of science and technology. "Clothing and shelter are now largely synthetic in those countries," he observes, "but food almost not at all. We may have to go that way in the poorest places just to keep the people alive in the year 2000, especially when you consider that 50% of the food shipped or grown in those places gets spoiled before reaching anyone. There's no connection between delivery and consumption."

Zettlemoyer observes that village people are totally out of the information loop when it comes to knowing about sources of help. But he agrees that it is at the village level where development must start. E. F. Schumacher addressed these issues in his book, "Small Is Beautiful—Economics as though People Mattered." Zettlemoyer, who has seen African villages, says he is familiar with the principles Schumacher expounded on the importance of small-scale technology at the village level. "I thought that was good stuff, because that's touching the problem where it is."

Economic critic Henderson is a disciple of Schumacher herself. It is the quality of life that needs to be put into the economic equations, along with balance of payment and production statistics. The point, she says, is that the indicators of well-being for the developing countries cannot be the same as those given for the industrial countries, because the patterns of industrial development simply may not be transferable. "The goals of these countries should be toward a basic inner structure that ensures that basic human needs are met first," she says. "We are in a fix because IMF will insist that the debtor countries establish policies that are aimed at achieving industrial rather than agricultural growth."

The dilemma was illustrated by Wharton's Perlmutter during his discussions with Henderson. "Let's say Zaire comes to the World Bank for a $2 billion loan for an aluminum plant. The bank is not likely to say, 'Why don't you spend it on villages, or get barter going?' It won't show up in the numbers indicating economic progress. Rather than let Zaire get into the grub of the world aluminum problems, because they have to sell it after they make it, maybe there are other ways to reward other concepts of development than largely westernized concepts.

"With very few resources, what do you do in those countries when you also include the mobilization of villages for health care and nutrition, or a mixture of cash crops and subsistence? I think these are really current ideas, because those motorcycles the villagers want

portion of the GNP equal to the chemical sector. Would the nation suffer an equivalent decline if only beauty shops and health clubs decline? Although the free market economy is the best approach to the promotion of economic growth, it must be handled with some restraint during the transition from semidevelopment to development. Otherwise, the social, political, and economic adjustments may be excessive.

The problem with the so-called Chicago Boys is that they took a textbook and said, "Friedman says to open the doors and let everything in." The first thing my chemistry hosts did during a visit recently is take me to a supermarket to show me what was on the shelves: Swiss, West German, American imports were all over. Then we went down the road the next day to the valley. The sugar beet factory was closed because sugar was being imported from all over.

The trouble with economists is that they don't look at real life. They look at models. Let the best man win. Let the poor competitors go under. The trouble with that is it's a formula for revolution.

**C&EN: Well then, what's wrong with economics that can be put right?**

**Szmant:** The economists obviously don't have the answers. Obviously, since World War II, they have had enough chances to prove the validity of their theories. You can use a perfectly normal and traditional economics to get the beginning of a process going. In chemical kinetics, every reaction rate follows a steep upward slope before leveling off. You can get economic growth like this achieved easily, like raising the output of oil from 10 to 13 barrels. That may be 30% growth, but usually if you try to go higher you run into some problems.

You can get high economic turnover in a developing country by building roads, dams, water supplies, and all the rest. They are easy to do. In fact, you can even install steel mills and refineries by shipping in whole plants on barges. But then the question becomes how you integrate this infrastructure with further progress that really affects the masses of people. That has not been addressed.

**C&EN: Okay, so what path do they take?**

**Szmant:** Shift from commodities to specialty chemicals. By doing that you get value-added products in such areas as specialty chemicals, lubricants, plasticizers, detergents, and the like. In many cases, the industrial countries no longer have an interest in developing those products. Otherwise, the developing countries remain stuck with exporting cheap copper or bananas or coconuts.

when they see them aren't coming around the corner very quickly."

Edward E. Zajak, head of the economics department at Bell Laboratories in Murray Hill, N.J., says economists indeed are beginning to look into social, philosophical, and ethical issues as they impart their advice to governments. "There's a great deal of interaction now," he says, "between philosophers and economists in questions like how you define justice—basic ethical questions—which gets back to the problems of distribution of income and labor. Economic man is so jam-packed with information that choices aren't that simple anymore. And that may be one of the new frontiers of economics. There is some concern that people on both sides of the market don't have the same amount of information."

But Zajak cautions critics not to be too tough on economists. Their theories have worked in the past, and they adapted creatively to changing social and technological conditions, right through such giants as Smith, Malthus, Ricardo, Marx, Pareto, Marshall, Keynes, and Schumpeter. The major economic figures had their models, and those models worked for the conditions of the time. And to Zajak, that should not be a cause for complaint. The field, he believes, does keep up. Its models are roughly sufficient.

"The simple linear theory you're taught in strength of materials as an engineer," he explains, "is a very simple one that works. It only crudely approximates the actual stresses of materials. But because it is crude doesn't mean you throw the theory out and go only with very complicated, sophisticated theories." So also for economic models.

Still, classical economics was grounded on metaphors supplied by the thermodynamics of mechanical engines. The textbooks tell one that. And some think that economics needs a more up-to-date metaphor drawn from today's scientific thinking. Zajak's former boss, William O. Baker, retired president of Bell Labs, agrees.

"We know," Baker says, "that the models of the machine today's neoclassical economics is built upon are completely unrealistic in a day of automata and computers. So the frames of reference, the mind sets of conventional economists, are probably wrong. They have to go back to school and get trained in new things."

One aspect Baker mentions that appears fascinating is that when economics was born, there was no understanding of what has since become the concept of social entropy. In short, society is entropic when there is a lot of "wasted" motion in getting work done. Modern communications, information, and computer science has made it possible to speed the activities of people and their handling of data and processes. There is a definite hidden economics to this process, with numerous implications, likened to the idea that the expansion of

knowledge, or information, is, with love and religious faith, a form of energy that does not dissipate on use. (The Pocantico economists, in fact, did, if whimsically, mention the underused quality of "amour" in the development of sound economic policies.)

To Baker, social entropy is diminished and even reversed by the kind of revolution he helped spearhead at Bell. He calls the upshot the "organization of knowledge for action," and adds that it certainly "puts a different cast".on economics.

One example is the way the computer and telecommunications have accelerated international banking transactions and refined investment strategies. "But you also see it on the assembly lines of plants and on the merchandising of goods," he says. "These are determined by databases along such factors as the colors of textiles or the shape of bottles for successful marketing. The cost of achieving variety has become greatly reduced because of these antientropic elements."

*Chubin: economics isn't to blame*

Author Paul Hawken, president of the tool-making company, Smith & Hawken Ltd., says the next economy is the "informative economy" explaining that as societies and industries are forced to become more energy efficient, the amount of information they require for doing that rises if one hopes to maintain one's standard of living.

"The critical difference between now and 20 years ago," he says in his just published book, "The Next Economy," "is that the manufacturer no longer can use just energy to increase his productivity. It's too expensive. Instead, the manufacturer has to become smarter at what he does."

So an informative economy, says Hawken, uses less mass by incorporating durability, quality, and conservation of materials into the products it makes. Such material is "value added," containing "far more information" than energy-efficient material.

"In an informative economy," he writes, "we change from an affluent to an influent society. If you are affluent, goods and services flow toward you; if you are influent, the information contained within goods flows into you. An affluent society may possess an opulent and abundant amount of goods, but that does not mean it will be able to utilize, appreciate, and maintain them. An influent society will have less, but its relationship to what it has will be more involved and concerned; people will take care of what they have, and what they have will mean more to them. In other words, an affluent society amasses goods, whereas an influent society processes the information within goods."

Hawken points out that "mass economy" governments need to begin understanding information as an economic policy principle. "The role of the government has been to keep the economic kettle boiling, primarily through monetary and tax policies," he says. "The U.S. government, like big business, has defined its role as the gatherer and keeper of information rather than the distributor of that information to society." What this new kind of thinking does is force consideration of the human value issues in the application of technology for development. A program at the World Bank under technology advisers Charles Weiss and Mario Kamenetzky is attempting to do just that: to educate economists about the role of technical choice in economic policy.

"It's a matter of making decisions that are optimal for the society," says Kamenetzky. "Choices forced by macroeconomic thinking are often not optimal because they respond to distorted signals from macro policy makers. What these countries are refusing to study is where is the appropriate balance between large-scale projects and successful village economies. Successful village economies, which often can incorporate sophisticated small-scale technologies, don't make up a significant proportion of a country's gross domestic product. So the macroeconomists at the International Monetary Fund, intent on developing an industrial infrastructure in a country, tend to play them down."

Kamenetzky sadly comments that the trend of technical thinking has been moving away from human values in the economic and technical scheme. "In 1972 I attended a meeting of chemical engineers in Paris. The theme was chemical engineering in the service of mankind, and there was considerable discussion of human value issues at it. But we have been moving backward since then. After the price of oil rose in 1973, all subsequent meetings had to do with improving the efficiency of production. The human value issue vanished."

Daryl E. Chubin, director of the technology and science policy program at Georgia Institute of Technology, thinks, as a social scientist, that the basic issue is shifting economic analysis in the direction of assessing the concept of equity on a global scale. "What I hear," he says, "is questions like whose planet is this anyway? Who has the right to what's on it? This is opposed to the current concepts of having a group of people in control of one set of resources, discussing how they control or manipulate them. The question, though, is how we can distribute them for their greatest benefit."

One of the things that eclipses everything else, Chubin feels, is that economics is a well-entrenched profession. Disciplines tend to put blinders on people and thus the experts need other disciplines to help them see the problem. "In a way, it's wrong to say that economics is to blame," he says. "Instead, we probably need to say we need new intellectual coalitions." □

# Chemical Earnings Beginning To Turn Around

**William J. Storck and David Webber,**
C&EN New York

The U.S. chemical industry's earnings have started to turn around, but there is a long, steep way to go before the chemical industry reaches performance matching its peak years. The industry is moving, but slowly.

Sales and earnings at major chemical companies in the second quarter, plus those at oil and diversified companies, show little growth from the same period a year ago, but chemical producers are heartened that the days of the big earnings declines seem to be over. And growth from the first quarter is very good indeed.

As a result of increased consumer demand, production of chemicals and allied products has increased more than 8% in the second quarter compared to the year earlier period.

The lag is in prices, which are still down about 1% from second-quarter 1982. However, even this gives a ray of hope for the chemical industry. With the increase in production, the lagging effect of prices will give the industry a lot of earnings leverage when tabs begin to turn around. And this turnaround is probably going to get a push in the third and fourth quarters. Already producers are saying that supply of some products, especially plastics, is beginning to get tight. This tightness in the market will easily facilitate price increases throughout the industry.

For the second quarter, combined results for 30 leading chemical companies were essentially unchanged from a year ago. Combined sales for the 30 companies totaled $17.4 billion, which was essentially the same as in the second quarter of 1982.

## Chemical industry leaders for second-quarter 1983 . . .

| Sales | | | | Earnings[a] | | | | Profitability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rank | | $ Millions | Rank 1982 | | $ Millions | Rank 1982 | | Earnings as % of sales | Rank 1982 |
| 1 | Dow Chemical | $2728.0 | 1 | Monsanto | $114.0 | 2 | International Flavors | 16.6% | 1 |
| 2 | Union Carbide | 2180.8 | 2 | Dow Chemical | 93.0 | 3 | Freeport-McMoRan | 11.2 | 2 |
| 3 | Monsanto | 1613.0 | 4 | PPG Industries | 63.0 | 5 | Nalco Chemical | 11.2 | 3 |
| 4 | W. R. Grace | 1605.6 | 3 | Union Carbide | 61.5 | 1 | Lubrizol | 9.6 | 6 |
| 5 | PPG Industries | 931.2 | 6 | Rohm & Haas | 43.1 | 6 | Loctite | 9.1 | 8 |
| 6 | American Cyanamid | 897.4 | 5 | American Cyanamid | 42.9 | 6 | Rohm & Haas | 8.3 | 13 |
| 7 | Celanese | 834.0 | 7 | W. R. Grace | 40.5 | 3 | Chemed | 7.6 | 6 |
| 8 | National Distillers | 663.2 | 11 | Hercules | 35.2 | 11 | Petrolite | 7.6 | 4 |
| 9 | Hercules | 634.0 | 8 | Ethyl | 28.9 | 8 | Monsanto | 7.1 | 8 |
| 10 | Rohm & Haas | 521.4 | 9 | Air Products | 27.1 | 17 | First Mississippi | 7.0 | 11 |

## . . . and for first-half 1983

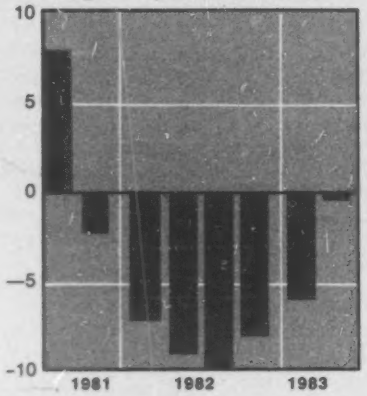
| Sales | | | | Earnings[a] | | | | Profitability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Rank | | $ Millions | Rank 1982 | | $ Millions | Rank 1982 | | Earnings as % of sales | Rank 1982 |
| 1 | Dow Chemical | $5266.0 | 1 | Monsanto | $215.0 | 1 | International Flavors | 15.9% | 1 |
| 2 | Union Carbide | 4371.6 | 2 | Dow Chemical | 147.0 | 3 | Freeport-McMoRan | 10.8 | 2 |
| 3 | Monsanto | 3101.0 | 3 | Union Carbide | 109.6 | 2 | Nalco Chemical | 10.8 | 5 |
| 4 | W. R. Grace | 2959.8 | 4 | PPG Industries | 95.0 | 6 | Lubrizol | 9.3 | 9 |
| 5 | PPG Industries | 1800.0 | 7 | Rohm & Haas | 76.8 | 12 | Loctite | 8.9 | 12 |
| 6 | American Cyanamid | 1722.7 | 5 | American Cyanamid | 70.1 | 7 | Petrolite | 8.3 | 4 |
| 7 | Celanese | 1600.0 | 6 | Hercules | 59.7 | 11 | Rohm & Haas | 7.8 | 17 |
| 8 | National Distillers | 1250.3 | 10 | Air Products | 51.7 | 8 | Chemed | 6.9 | 7 |
| 9 | Hercules | 1236.0 | 8 | Ethyl | 49.1 | 10 | Monsanto | 6.9 | 8 |
| 10 | Rohm & Haas | 983.4 | 9 | Olin | 46.6 | 9 | Air Products | 6.2 | 10 |

a After taxes. **Note:** For 30 companies listed on page 16.

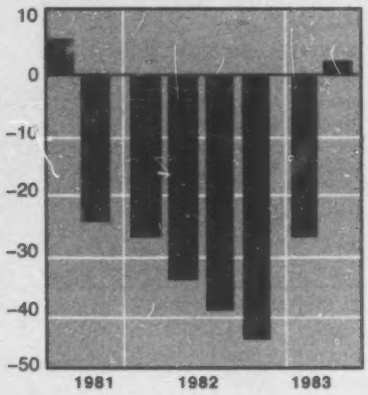
# Chemical industry 1983 second-quarter results

- Sales down slightly
- Earnings finally rise
- Profitability rises to 4.6%
- Production is up 8.1%
- Prices are still down

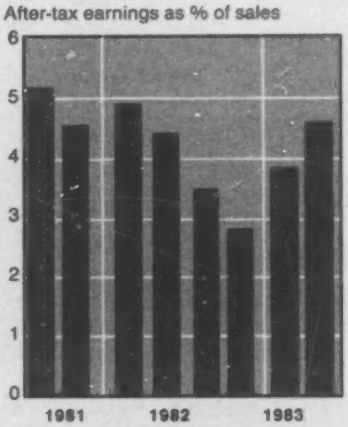
**Sales**
% change from year-earlier quarter



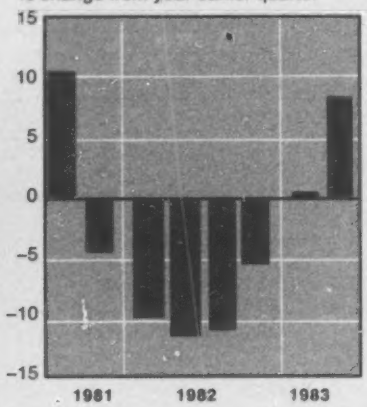

**Earnings**
% change from year-earlier quarter



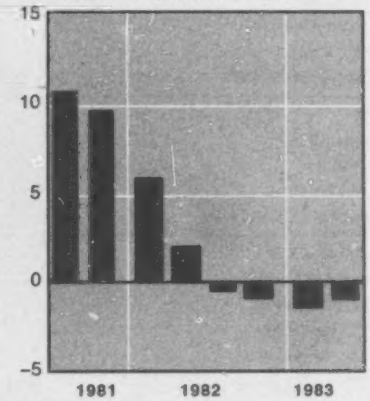

**Profit margins**
After-tax earnings as % of sales




**Production**
% change from year-earlier quarter

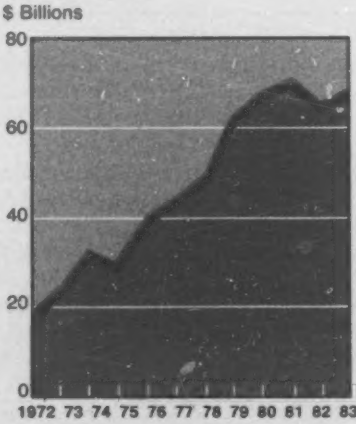



**Prices**
% change from year-earlier quarter

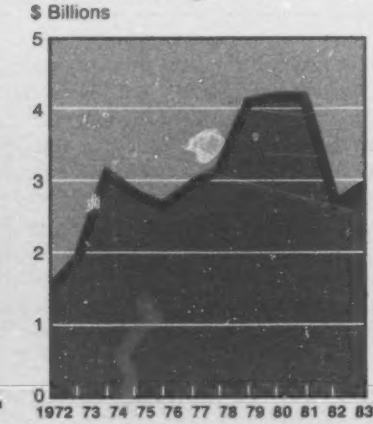



## Sales in 1983 will increase 8% and earnings will rise 12%, pushing profitability up to 4.2%

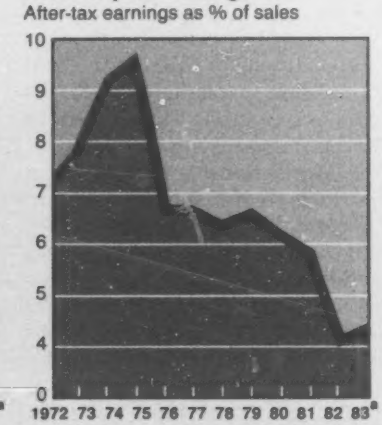
**Annual sales**
$ Billions




**Annual earnings**
$ Billions




**Annual profit margins**
After-tax earnings as % of sales




* C&EN estimates. **Note:** All sales, earnings, and profit-margin data are based on the combined performance of the 30 chemical companies listed on page 16.

## Days of double-digit earnings declines for chemical industry seem to be over

| | SECOND-QUARTER 1983 | | | | | | FIRST-HALF 1983 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sales | Earnings | Change from 1982 | | Profit margin[a] | | Sales | Earnings | Change from 1982 | |
| | ($ millions) | | Sales | Earnings | 1983 | 1982 | ($ millions) | | Sales | Earnings |
| Air Products | $ 415.9 | $ 27.1 | 9% | 82% | 6.5% | 3.9% | $ 829.9 | $ 51.7 | 6% | −3% |
| American Cyanamid | 897.4 | 42.9 | −2 | 53 | 5.1 | 3.1 | 1722.7 | 70.1 | −1 | 6 |
| Celanese | 834.0 | 21.0 | 6 | 17 | 2.5 | 2.3 | 1600.0 | 27.0 | −2 | −29 |
| Chemed | 65.0 | 4.9 | 0 | 23 | 7.6 | 6.2 | 125.5 | 8.8 | 1 | −7 |
| Crompton & Knowles | 60.8 | 2.1 | 9 | 62 | 3.5 | 2.3 | 115.2 | 3.4 | 5 | 62 |
| Dow Chemical[b] | 2728.0 | 93.0 | 0 | 21 | 3.4 | 2.8 | 5266.0 | 147.0 | 4 | −16 |
| Ethyl | 447.9 | 28.9 | 7 | 3 | 6.5 | 6.7 | 843.7 | 49.1 | 3 | 9 |
| First Mississippi | 64.2 | 4.5 | 3 | 29 | 7.0 | 5.6 | 111.2 | 6.2 | −2 | −28 |
| Freeport-McMoRan | 186.2 | 20.9 | 6 | −8 | 11.2 | 12.9 | 390.4 | 42.0 | 6 | −15 |
| H. B. Fuller[c] | 110.8 | 3.6 | 34 | 20 | 3.2 | 3.6 | 206.3 | 5.4 | 33 | 35 |
| W. R. Grace[d] | 1605.6 | 40.5 | −2 | −47 | 2.5 | 4.7 | 2959.8 | 73.6 | −5 | −53 |
| Hercules[e] | 634.0 | 35.2 | −3 | 58 | 5.6 | 3.4 | 1236.0 | 59.7 | −4 | 35 |
| International Flavors | 126.3 | 21.0 | 2 | 6 | 16.6 | 16.0 | 247.8 | 39.3 | 2 | 4 |
| International Minerals | 438.4 | 13.2 | 9 | 71 | 3.0 | 1.9 | 810.0 | 34.4 | −1 | 22 |
| Loctite | 57.2 | 5.2 | 5 | 63 | 9.1 | 5.9 | 112.6 | 10.0 | 3 | 54 |
| Lubrizol[f] | 211.3 | 20.3 | −4 | 49 | 9.6 | 6.2 | 395.8 | 37.0 | −5 | 27 |
| Monsanto[f] | 1613.0 | 114.0 | −1 | 19 | 7.1 | 5.9 | 3101.0 | 215.0 | −8 | −12 |
| Morton-Thiokol[g] | 446.4 | 19.7 | — | — | 4.4 | 5.8 | 902.0 | 43.1 | — | — |
| Nalco Chemical[h] | 164.2 | 18.4 | −1 | 12 | 11.2 | 9.9 | 323.7 | 34.9 | 0 | 10 |
| National Distillers[h] | 663.2 | 12.4 | 43 | −44 | 1.9 | 4.8 | 1250.3 | 27.4 | 35 | −30 |
| Olin | 490.3 | 24.0 | 3 | 3 | 4.9 | 4.9 | 963.4 | 46.6 | −1 | 3 |
| Pennwalt | 246.5 | 6.9 | −3 | −37 | 2.8 | 4.3 | 484.4 | 13.2 | −3 | −23 |
| Petrolite | 72.3 | 5.5 | −4 | −25 | 7.6 | 9.7 | 144.2 | 11.9 | −8 | −25 |
| PPG Industries | 931.2 | 63.0 | 6 | 38 | 6.8 | 5.2 | 1800.0 | 95.0 | 13 | 36 |
| Reichhold Chemicals[i] | 194.8 | 6.6 | −8 | 74 | 3.4 | 1.8 | 373.3 | 10.7 | −11 | 51 |
| Rohm & Haas | 521.4 | 43.1 | −1 | 54 | 8.3 | 5.3 | 983.4 | 76.8 | −2 | 75 |
| Stauffer Chemical[j] | 291.4 | 3.2 | −5 | −82 | 1.1 | 5.6 | 655.4 | 30.7 | −30 | −80 |
| Union Carbide | 2180.8 | 61.5 | −5 | −48 | 2.8 | 5.1 | 4371.6 | 109.6 | −5 | −48 |
| Williams Cos.[k] | 392.8 | 19.0 | −30 | −14 | 4.8 | 3.5 | 762.0 | 27.6 | −20 | 9 |
| Witco Chemical[l] | 343.4 | 12.4 | 2 | 39 | 3.6 | 2.6 | 666.4 | 23.0 | −1 | 80 |
| **Total 15 largest companies[m,n]** | **$14,847.5** | **$639.5** | **2%** | **2%** | **4.3%** | **4.3%** | **$28,639.8** | **$1126.1** | **−2%** | **−14%** |
| **Second 15 companies[m]** | **$2,587.2** | **$153.5** | **−6%** | **−1%** | **5.9%** | **5.7%** | **$5,114.2** | **$280.3** | **−9%** | **−14%** |
| **GRAND TOTAL[n]** | **$17,434.7** | **$793.0** | **0%** | **2%** | **4.6%** | **4.5%** | **$33,754.0** | **$1406.4** | **−3%** | **−14%** |

a After-tax income as a percentage of sales. b Excludes $120 million nonrecurring gain in second-quarter 1982. c Excludes $900,000 extraordinary gain in first-half 1982. d Excludes $65.1 million nonrecurring gain in first-half 1982. e Excludes $11.8 million nonrecurring gain in second-quarter 1983. f Excludes $9 million nonrecurring charge in second-quarter 1982. g Since merger of Morton and Thiokol, previous figures have not been restated, making comparison with prior data meaningless. h Excludes net nonrecurring charge of $4.3 million in second-quarter 1982 and net nonrecurring gain of $7.2 million in first-half 1982. i Excludes nonrecurring loss of $900,000 in second-quarter 1982. j Excludes $8.7 million extraordinary gain in second-quarter 1982 and $10.6 million extraordinary gain for first-half 1983. k Excludes $16.6 million nonrecurring charge in second-quarter 1983. l Excludes nonrecurring charge of $1.5 million in sec-

Earnings, however, increased 2% to $793 million, ending six straight quarters of year-to-year declines in chemical income.

The larger companies on the list outperformed the smaller firms in the second quarter. Combined sales of the 15 larger chemical companies increased 2% to $14.8 billion; earnings increased a like amount to about $640 million. At the smaller firms sales and earnings continued to decline. Combined sales for the smaller firms fell 6% to $2.6 billion from year-ago levels, and earnings edged down 1% to $154 million.

The smaller firms continued to lead in profitability, however. Profit margins for the smaller companies in the second quarter averaged 5.9% compared to 4.3% for the larger firms. In the second quarter a year ago, the smaller firms had an average profit margin of 5.7% in contrast to 4.3% for the larger companies. For the 30 companies as a whole, profit margins inched up to an average of 4.6% in the second three months this year compared to 4.5% in the same period a year ago.

Though the second quarter looks flat viewed against results of last year, when compared with this year's first quarter, it seems very good indeed. Sales for the second quarter are up about 4% from the first quarter, but earnings are up more than 23%. This is in spite of a normal seasonal rise of 8 to 10% in earnings between the first and second quarters.

The quarter-to-quarter rise was due entirely to the performance of the 15 largest companies. Combined sales for this group increased 4.6% and earnings jumped 31%. For the group of smaller companies, sales were off almost 2%, whereas earnings managed to stay even with the first three months of the year.

For the first half, the gains of the second quarter have not erased the problems of the first. Combined first-half sales at the 30 companies were still off 3% from year-ago levels

| FIRST-HALF 1983 | | 12-MONTH RUNNING DATA | | | |
|---|---|---|---|---|---|
| Profit margin[a] | | Change from 1982 | | Profit margin[a] | |
| 1983 | 1982 | Sales | Earnings | 1983 | 1982 |
| 6.2% | 6.9% | 5% | −9% | 6.5% | 7.5% |
| 4.1 | 3.8 | −5 | −26 | 3.8 | 4.9 |
| 1.7 | 2.3 | −13 | def | def | 3.0 |
| 6.9 | 7.4 | −1 | −32 | 6.5 | 9.4 |
| 3.0 | 1.9 | −4 | −22 | 2.3 | 2.9 |
| 2.8 | 3.2 | −3 | −49 | 1.9 | 3.5 |
| 5.8 | 5.5 | −4 | 7 | 6.0 | 5.4 |
| 5.6 | 7.6 | −22 | −4 | 7.0 | 5.6 |
| 10.8 | 13.3 | −1 | −10 | 12.7 | 14.1 |
| 2.6 | 2.6 | 19 | −9 | 2.6 | 3.4 |
| 2.5 | 5.0 | −7 | −49 | 2.9 | 5.2 |
| 4.8 | 3.4 | −8 | −12 | 4.5 | 4.7 |
| 15.9 | 15.6 | 1 | 5 | 14.3 | 13.7 |
| 4.2 | 3.4 | −11 | −16 | 5.4 | 5.7 |
| 8.9 | 6.0 | 0 | 19 | 7.9 | 6.7 |
| 9.3 | 7.0 | −6 | −33 | 7.1 | 9.8 |
| 6.9 | 7.2 | −7 | −4 | 5.4 | 5.2 |
| 4.8 | 6.9 | — | — | — | — |
| 10.8 | 9.8 | −4 | −11 | 10.3 | 11.1 |
| 2.2 | 4.2 | 12 | −49 | 2.8 | 6.1 |
| 4.8 | 4.7 | −5 | −17 | 3.5 | 4.0 |
| 2.7 | 3.4 | −2 | −37 | 2.2 | 3.4 |
| 8.3 | 10.0 | −6 | −13 | 8.7 | 9.4 |
| 5.3 | 4.4 | 4 | 22 | 5.6 | 4.7 |
| 2.9 | 1.7 | −15 | −14 | 1.7 | 1.7 |
| 7.8 | 4.4 | −3 | 35 | 6.0 | 4.3 |
| 3.1 | 10.6 | −19 | −71 | 3.0 | 8.3 |
| 2.5 | 4.5 | −7 | −60 | 2.2 | 5.1 |
| 3.6 | 2.7 | −19 | −18 | 2.1 | 2.1 |
| 3.5 | 1.9 | 0 | 12 | 3.0 | 2.7 |
| **3.9%** | **4.5%** | **−3%** | **−32%** | **3.3%** | **4.8%** |
| **5.5%** | **5.8%** | **−8%** | **−26%** | **5.1%** | **6.4%** |
| **4.2%** | **4.7%** | **−4%** | **−31%** | **3.6%** | **5.0%** |

ond-quarter 1982 and net nonrecurring gain of $3.1 million in first-half 1982. m Division between large and small companies is about $400 million in second-quarter 1983. n Per cent change and profit margin averages exclude results of Morton-Thiokol. def = deficit.

to $33.8 billion, whereas earnings were down 14% to $1.4 billion. At the 15 larger companies, sales were down 2% to $28.6 billion and net income at $1.1 billion was down 14%. Combined earnings at the smaller companies were down 14% to $280 million; sales fell 9% to $5.1 billion.

Chemical executives generally seem satisfied with the second quarter and are buoyant about the remainder of the year.

At Dow Chemical, president and chief executive officer Paul F. Oreffice says, "In May, business started to benefit from the U.S. economic recovery and June was our best month since June 1981. One of the most positive points of the quarter was the increase we have seen in product volume." He adds, "Plastics demand was particularly strong with Dowlex linear low-density polyethylene leading the way."

Fibers sales also improved in the second quarter. Celanese chairman John D. Macomber says, "Our fibers business picked up strength," which was something of an understatement. Fibers earnings at Celanese in the second quarter were $1.03 per share, up more than 500% from 17 cents a share in second-quarter 1982.

Agriculture continued to have a bad effect on earnings, however. For example, at W. R. Grace earnings from the agricultural chemicals group in the second quarter this year were $1.6 million, down 86% from the second quarter of 1982.

Whether with the recovery under way companies are paying less attention to operations or they are more interested in improved demand, few chemical firms mentioned that they were achieving greater operating efficiencies.

Air Products was one firm that did mention cost containment. Chairman Edward Donley says, "Despite our optimism that the recovery now under way in the U.S. will continue, we are keeping a tight rein on costs. We are meeting our ambitious productivity improvement goals and are continuing to emphasize the long-term importance of productivity improvement."

Although few chemical companies mentioned cost containment, the same was definitely not true for the oil and diversified companies.

For energy companies and diversified manufacturers with chemical operations, renewed emphasis on efficiency and debt-reduction programs paid off well in the second quarter. The 26 biggest diversified manufacturers, for instance, eked out a bare 0.7% increase in sales revenue (combined) compared to the second quarter of 1982, but combined net income (minus nonrecurring gains and charges) rose a substantial 7.9%. Oil and gas company results give an even more marked testimony to the rewards of tougher management: Revenues, undermined by low prices for oil, slumped 9.4% at the 19 largest producers, but net income jumped 7.4%.

The cost-cutting successes were especially timely for the many companies whose primary products have not yet benefited much from the general economic recovery. Crude oil—saddled with lower prices; natural gas—with slumping demand; and steel—in a state approaching morbidity, fall distinctly into that category. And chemical results, though generally better than those of the basic materials, were mixed. Firms with concentrations in plastics, for example, did well, but those with fertilizer materials and agricultural chemicals suffered from the effects of the food glut and the PIK (payment-in-kind) program. Even where chemical sales and earnings were up healthily, most of the energy and diversified firms do not have a big enough stake in chemicals to turn around overall corporate results. The average (unweighted) percentage of sales accounted for by chemicals among diversified manufacturers is only 22%. Among the oil and gas companies, it is a scant 8%.

As a result, many chief executives are voluble about cost-cutting measures but somewhat muffled on the subject of sales in the current batch of earnings statements. Allied Corp. chairman Edward L. Hennessy Jr., for example, notes that his company chopped $687 million off total debt between last September and June 30, bringing its ratio of long-term debt to total capital (including Bendix on a pro forma basis) down from 37.7% in September to 28.7% at the end of the second quarter. Du Pont, reports chairman Edward G. Jefferson, lowered its debt ratio two points to 34% over the course of the first six months of the year.

When they can, chief executives also stress the impact of efficiency

## Oil and gas, diversified manufacturing earnings rose moderately

| | % chemical sales | SECOND-QUARTER 1983 Sales ($ millions) | Earnings | Change from 1982 Sales | Earnings | Profit margin 1983 | 1982 | FIRST-HALF 1983 Sales ($ millions) | Earnings | Change from 1982 Sales | Earnings | Profit margin 1983 | 1982 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OIL AND GAS COMPANIES** | | | | | | | | | | | | | |
| American Petrofina | 11% | $ 594.1 | $ 8.6 | −2% | −21% | 1.5% | 1.8% | $ 1,018.4 | $ 8.9 | −14% | −67% | 0.9% | 2.3% |
| Atlantic Richfield | 8 | 6,523.2 | 393.4 | −4 | −4 | 6.0 | 6.0 | 12,842.4 | 723.8 | −3 | −9 | 5.6 | 6.0 |
| El Paso | 15 | 984.3 | 22.9 | −6 | 26 | 2.3 | 1.7 | 2,207.1 | 37.1 | 5 | −6 | 1.7 | 1.9 |
| Exxon[a] | 7 | 22,881.0 | 1075.0 | −9 | 31 | 4.7 | 3.3 | 46,586.0 | 2135.0 | −10 | 29 | 4.6 | 3.2 |
| Getty Oil[b] | 2 | 3,006.6 | 163.9 | −3 | 5 | 5.5 | 5.1 | 6,025.5 | 321.7 | −4 | −4 | 5.3 | 5.4 |
| Gulf Oil[c] | 7 | 6,987.0 | 203.0 | −6 | 25 | 2.9 | 2.2 | 13,865.0 | 356.0 | −7 | −10 | 2.6 | 2.6 |
| Internorth[d] | 8 | 1,058.1 | 37.5 | 47 | 50 | 3.5 | 3.5 | 2,417.9 | 139.4 | 12 | 5 | 5.8 | 6.2 |
| Kerr-McGee[e] | 13 | 835.5 | 37.8 | −8 | −25 | 4.5 | 5.5 | 1,686.1 | 61.5 | −9 | −36 | 3.7 | 5.2 |
| Mobil | 4 | 14,402.0 | 402.0 | −9 | 40 | 2.8 | 1.8 | 28,690.0 | 652.0 | −11 | 23 | 2.3 | 1.7 |
| Occidental[f] | na | 4,615.8 | 10.5 | 7 | −84 | 0.2 | 1.5 | 9,505.8 | 36.4 | 12 | −72 | 0.4 | 1.5 |
| Phillips Petroleum[g] | 15 | 3,790.0 | 137.0 | −6 | −6 | 3.6 | 3.6 | 7,430.0 | 266.0 | −5 | −9 | 3.6 | 3.7 |
| Shell Oil[h] | 17 | 4,872.0 | 390.0 | −5 | 11 | 8.0 | 6.9 | 9,517.0 | 636.0 | −4 | −8 | 6.7 | 7.0 |
| Standard Oil of California | 3 | 7,092.0 | 368.0 | −24 | 40 | 5.2 | 2.8 | 14,087.0 | 678.0 | −27 | 38 | 4.8 | 2.5 |
| Standard Oil (Ind.)[i] | 9 | 7,400.0 | 426.0 | −3 | 11 | 5.8 | 5.0 | 14,900.0 | 825.0 | 1 | −3 | 5.5 | 5.8 |
| Standard Oil (Ohio)[j] | 4 | 3,101.0 | 476.0 | −8 | 1 | 15.4 | 14.0 | 5,867.0 | 828.0 | −16 | −11 | 14.1 | 13.3 |
| Sun Co. | 3 | 3,780.0 | 135.0 | −9 | 23 | 3.6 | 2.6 | 7,520.0 | 225.0 | −8 | −4 | 3.0 | 2.9 |
| Tenneco[k] | 7 | 3,566.0 | 205.0 | −3 | −12 | 5.8 | 6.3 | 7,175.0 | 315.0 | −4 | −13 | 4.4 | 4.8 |
| Texaco | 3 | 9,900.0 | 327.0 | −14 | 7 | 3.3 | 2.7 | 20,100.0 | 646.0 | −18 | −4 | 3.2 | 2.7 |
| Unocal | 11 | 2,800.0 | 139.4 | −4 | −30 | 5.0 | 6.8 | 5,300.0 | 267.7 | −2 | −27 | 5.1 | 6.8 |
| **DIVERSIFIED MANUFACTURERS** | | | | | | | | | | | | | |
| Aluminum Co. of America[l] | 11 | 1,257.9 | 23.7 | 2 | — | 1.9 | def | 2,400.1 | −5.3 | −2 | def | def | 2.1 |
| Allied[m] | 23 | 2,621.0 | 106.0 | −1 | −5 | 4.0 | 4.2 | 5,189.0 | 224.0 | −3 | 18 | 4.3 | 3.6 |
| Beatrice Foods[n] | 5 | 2,315.9 | 75.5 | 2 | 5 | 3.3 | 3.2 | 4,593.2 | 155.0 | 2 | 6 | 3.4 | 3.2 |
| Borden[o] | 30 | 1,084.0 | 45.7 | 4 | 43 | 4.2 | 3.1 | 2,021.4 | 68.3 | 3 | 39 | 3.4 | 2.5 |
| Borg-Warner | 19 | 881.1 | 45.0 | 4 | −4 | 5.1 | 5.5 | 1,694.6 | 80.5 | 7 | −3 | 4.8 | 5.3 |
| Diamond-Shamrock[p] | 31 | 978.4 | 26.3 | 14 | −18 | 2.7 | 3.7 | 1,833.8 | 30.9 | 11 | −49 | 1.6 | 3.7 |
| Du Pont | 33 | 8,854.0 | 271.0 | 5 | 10 | 3.1 | 2.9 | 17,451.0 | 474.0 | 4 | −5 | 2.7 | 3.0 |
| Eastman Kodak[q] | 20 | 2,396.0 | 286.6 | −1 | −26 | 12.0 | 16.0 | 4,525.9 | 363.8 | −3 | −47 | 8.0 | 14.6 |
| Engelhard | 12 | 617.0 | 18.0 | 38 | 10 | 2.9 | 3.6 | 1,228.4 | 34.2 | 39 | 12 | 2.8 | 3.5 |
| FMC | 37 | 878.3 | 38.9 | −3 | −14 | 4.4 | 5.0 | 1,732.0 | 70.4 | −1 | −9 | 4.1 | 4.4 |
| General Electric | 4 | 6,720.0 | 521.0 | 1 | 12 | 7.8 | 7.0 | 12,820.0 | 946.0 | 1 | 12 | 7.4 | 6.7 |
| Georgia-Pacific[r] | 12 | 1,699.0 | 56.0 | 20 | −21 | 3.3 | 5.0 | 3,118.0 | 86.0 | 19 | −62 | 2.8 | 8.7 |
| B. F. Goodrich[s] | 37 | 798.6 | 4.2 | 1 | −29 | 0.5 | 0.7 | 1,500.0 | −3.6 | 0 | def | def | def |
| Kaiser Aluminum | 22 | 775.2 | −51.3 | −5 | def | def | def | 1,361.3 | −80.1 | −12 | def | def | def |
| Koppers[t] | 34 | 380.2 | 5.2 | −9 | −37 | 1.4 | 2.0 | 667.9 | −7.6 | −11 | def | def | def |
| Eli Lilly | 27 | 740.6 | 101.9 | 5 | 9 | 13.8 | 13.2 | 1,572.5 | 238.1 | 0 | 4 | 15.1 | 14.6 |
| Merck | 21 | 821.9 | 123.3 | 6 | 11 | 15.0 | 14.4 | 1,592.6 | 237.0 | 5 | 7 | 14.9 | 14.6 |
| NL Industries[u] | 33 | 346.7 | −14.5 | −43 | def | def | 11.8 | 718.1 | −20.2 | −43 | def | def | 13.1 |
| Northwest Industries | 22 | 501.3 | 1.8 | −25 | −98 | 0.4 | 11.4 | 920.5 | 3.2 | −37 | −98 | 0.4 | 11.7 |
| Pfizer[v] | 11 | 920.9 | 102.2 | 4 | 39 | 11.1 | 8.3 | 1,831.3 | 200.4 | 7 | 33 | 10.9 | 8.9 |
| 3M | 15 | 1,779.0 | 169.0 | 6 | 6 | 9.5 | 9.4 | 3,482.0 | 326.0 | 4 | 5 | 9.4 | 9.3 |
| Tyler[w] | 35 | 229.9 | 5.3 | 4 | 56 | 2.3 | 1.5 | 442.0 | 6.0 | 3 | 76 | 1.4 | 0.8 |
| Uniroyal[x] | 31 | 545.8 | 19.6 | 1 | 142 | 3.6 | 1.5 | 996.3 | 23.2 | −3 | 150 | 2.3 | 1.0 |
| U.S. Steel[y] | 6 | 4,400.0 | −239.0 | −14 | def | def | def | 8,260.0 | −357.0 | −18 | def | def | def |
| Upjohn | 17 | 519.2 | 44.0 | 9 | 15 | 8.5 | 8.1 | 1,003.3 | 89.5 | 7 | 10 | 8.9 | 8.7 |
| Vulcan Materials | 37 | 199.9 | 15.4 | 6 | −18 | 7.7 | 10.0 | 354.5 | 15.3 | 1 | −46 | 4.3 | 8.1 |

a Excludes nonrecurring charge of $106 million and gain of $136 million in second-quarter 1982. b Excludes nonrecurring charge of $250 million in second-quarter 1983. c Excludes nonrecurring gains totaling $20 million in second-quarter 1983, $49 million in first-half 1983, $65 million in second-quarter 1982, and $120 million in first-half 1982. d Excludes nonrecurring charges of $5.3 million in second-quarter 1983, $2.5 million in second-quarter 1982, and $4.2 million in first-half 1982. e Excludes nonrecurring charge of $17 million in first-half 1982. f Excludes nonrecurring gain of $141.1 million in second-quarter 1983 and charge of $8.6 million in first-half 1983; includes 1983 results of Cities Service Co. g Excludes nonrecurring gains totaling $32 million in second-quarter 1983 and $47 million in first-half 1982. h Excludes nonrecurring gain of $30 million in second-quarter 1982. i Excludes offsetting nonrecurring gain and charge in second-quarter 1983. j Excludes nonrecurring charge of $75 million in first-half 1983. k Excludes nonrecurring charge of $28 million in second-quarter 1982. l Excludes nonrecurring gain of $19.9 million in first-half 1982. m 1983 results reflect consolidation of Bendix and its ownership interest in Martin Marietta; pro forma data on a comparable basis for 1982 are used. n Results are for three months ending May 31 (first quarter of Beatrice Food's fiscal year 1984). o Excludes nonrecurring gains of $17 million in first-half 1983 and $38.3 million in first-half 1982. p Excludes nonrecurring gain of $3.3 million in second-quarter 1983. q Results are for periods ending June 12, 1983, and June 13, 1982. r Includes nonrecurring pretax gains of $28 million in first-half 1983 and $105 million in first-half 1982. s Excludes nonrecurring gains totaling $1.9 million in second-quarter 1983 and $13.5 million in second-quarter 1982. t Excludes nonrecurring gain of $5 million in second-quarter 1983. u Excludes nonrecurring charges totaling $86.1 million in second-quarter 1983. v Excludes nonrecurring gains of $4.4 million in second-quarter 1983, $8.7 million in first-half 1983, $7.8 million in second-quarter 1982, and $19.7 million in first-half 1982; 1982 results include results for Valleylab on a pro forma basis. w Excludes nonrecurring gain of $800,000 in first-half 1983. x Excludes nonrecurring gain of $18 million in first-half 1982. y Excludes nonrecurring gains totaling $127 million in second-quarter 1983 and $423 million in second-quarter 1982. def = deficit. na = not available.

## Energy company petrochemical earnings are mixed

For oil and gas companies with chemical operations, depressed prices were as much a problem with their petrochemical products during the second quarter as with their primary energy materials. The difference was that sales volumes were up—in some cases substantially—in the companies' chemical units. As a result, about half of the 19 largest companies reported increased earnings from chemicals in the second period.

In fact, the aggregate results of eight producers reporting after-tax income from chemicals shows a 57% rise in net compared to second-quarter 1982. That total is more a barometer of a general turnaround than an accurate measure of overall improvement, however, since the bulk of the gain comes from two firms—Exxon, with an 89% increase, and Occidental Petroleum, which countered a large loss in 1982 with a small net this year. In addition, Getty Oil income rose, and perennially losing Gulf Oil recorded a smaller deficit than before.

Among companies reporting pretax chemical income, Atlantic Richfield recorded a $33 million operating income compared to a loss of $9 million in second-quarter 1982. And American Petrofina attributes a rise in income between the first and second quarters of 1983 primarily to a return to profitability in the petrochemicals and plastics segment.

The biggest loser remained Gulf. Chairman James E. Lee notes that although the company is seeing higher sales and production volumes for most petrochemical and plastics products, prices have not yet reached satisfactory levels. Mobil, which rebounded from a big first-quarter loss, returned chemical earnings still far below those of second-quarter 1982. The company briefly blames the decline on "weak market conditions." Standard Oil (Ind.), though recording a large decline from second-quarter 1982, comments with satisfaction on increases in sales volumes since late 1982.

El Paso, which is rumored to be trying to unload its chemical operation, says only that it lost as much on chemicals during the second quarter and first half of 1983 as it did during the comparable periods in 1982. At Unocal, parent of Union Oil of California, lower earnings from chemical operations contributed to a 30% decline in corporate income.

Still, the majority of the energy companies find hope in improvement between the first and the second quarters of this year. "While [chemical] industry overcapacity problems persist," remarks Shell Oil president John F. Bookout, whose firm reported a 17% decline in chemical earnings, "the combination of higher prices, stable feedstock costs, and rising volumes tied to renewed economic growth point to improving performance."

AFTER-TAX EARNINGS ON CHEMICALS

| | Second quarter | | | First half | | |
|---|---|---|---|---|---|---|
| $ Millions | 1983 | 1982 | % change | 1983 | 1982 | % change |
| Exxon | $53.0 | $28.0 | 89% | $85.0 | $ 55.0 | 55% |
| Getty Oil[a] | 3.4 | 2.4 | 45 | −30.1 | 19.0 | def |
| Gulf Oil | −32.0 | −36.0 | def | −71.0 | −112.0 | def |
| Internorth | −1.8 | 0.9 | def | −1.8 | 3.5 | def |
| Mobil | 7.0 | 13.0 | −46 | −7.0 | 26.0 | def |
| Occidental | 4.0 | −12.5 | — | 20.8 | −19.3 | — |
| Shell Oil | 5.0 | 6.0 | −17 | 24.0 | 16.0 | 50 |
| Standard Oil (Ind.)[b] | 30.0 | 42.0 | −29 | 34.0 | 83.0 | −59 |

a Results are for Getty's refining, marketing, and chemicals operations. b Excludes nonrecurring $14 million gain in first-quarter 1982. **def** = deficit.

gains on earnings. Exxon Corp., for example, points out that the company's total operating, selling, and administrative expense in second-quarter 1983 was $400 million less than in 1982.

Still, only 12 of 26 diversified firms with chemical interests managed to raise earnings in the second quarter. The rest either had their net decline or recorded a deficit. The biggest gainers were Uniroyal, Tyler, Borden, and Pfizer. Stars on the debit side were Northwest Industries (owner of Velsicol Chemical), Koppers, B. F. Goodrich, Eastman Kodak, and Georgia-Pacific.

The performance of these companies' chemical operations was equally mixed. Agricultural glut and PIK blasted chemical income at Pfizer, sales of whose Treflan herbicide continued to wither, and at Northwest Industries' Velsicol, whose chemical and electrical operating earnings dropped 4%. Slumping caustic soda prices played the major role in bringing down chemical earnings at Vulcan Materials 80% and in FMC's industrial chemicals segment 6%. Even specialties were no talisman for success: "Specialty chemical and environmental products sales continued to be affected by depressed economic conditions worldwide and had a significant adverse impact on the company's results," comments Merck & Co.

At Du Pont, on the other hand, chemical and related earnings were up mightily—47%, compared to a corporate income jump of 10%. The company's after-tax income rose 329% for fibers, 206% for polymer products, and even 7% for agricultural and industrial chemicals. Allied chemical income rose 12%, and both Georgia-Pacific and Borden, with large polyvinyl chloride production, report substantial gains in chemical segment earnings.

What is perhaps most encouraging to companies weighing their performance over the half year and more since the official end of the recession is the pace, if not yet the size, of the recovery. A year-to-year comparison of the second quarters reveals the laudable 7.9% rise in earnings with its disappointing 0.7% rise in sales dollars. A comparison of second-quarter to first-quarter 1983, on the other hand, gives what may be a better gauge of the recovery's rate of acceleration: Among the 26 diversified firms, sales rose 7.9% and earnings a resounding 30.2%. That could be taken as an encouraging sign indeed. □

# Some Canadian Chemical Firms Rebound

Better is preferable to worse. But it is not necessarily good. That's the situation that Canadian chemical companies find themselves in as they pass the year's half-way mark.

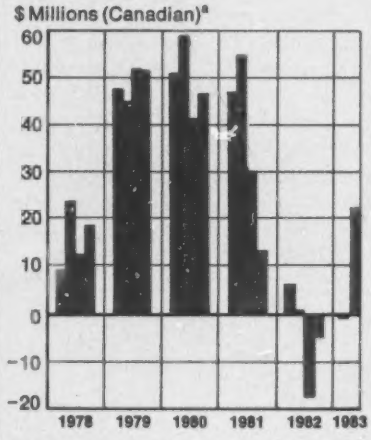
Canada's economy is on the mend and the country's beleaguered chemical companies are trying to get back into the black after last year's flood of red ink. Some are succeeding.

For most companies, second-quarter sales and earnings are much better than they were in the previous quarter. They also show a significant improvement over what they were a year ago. For the entire first half, however, the trend is not quite that clear-cut. Some companies are ahead of last year's pace in both sales and earnings. Others are not.

C-I-L Inc. is one that is not. Its second-quarter sales of $312 million (Canadian) are up only marginally over last year. Coupled with a poor first quarter, it has pushed company sales for the first six months down 3.2% compared to the first six months of 1982. Earnings are in the same boat. A good second quarter could not compensate for a poor first quarter and, as a result, C-I-L's earnings for the first half, at $13.9 million, are 16.8% lower than last year.

C-I-L's problem is that some of its major markets haven't jumped on the recovery bandwagon yet. This is particularly true of mining and agriculture, which have crimped company sales of explosives, mining equipment, fertilizers, and agricultural chemicals. Sales of paints, plastics, and some specialty chemicals have been strong and have kept matters from being worse.

**Profits return in second quarter**




a After-tax earnings of four largest publicly reporting Canadian chemical companies—Celanese Canada, C-I-L, Du Pont Canada, and Union Carbide Canada.

Union Carbide Canada, one of the hardest-hit Canadian chemical companies last year, still is in the red. Through the first six months, it has lost $9 million, compared to $5.7 million last year. Sales are down, too, for the first half, but chairman W. Norman Kissick believes that things will improve for Carbide Canada.

Among the large, publicly reporting Canadian chemical companies, Celanese Canada and Du Pont Canada have done better than most in turning losses into profits. Celanese, for instance, lost $2.5 million during the first six months of 1982. This year, it recorded earnings of $3.7 million on much higher sales ($193 million).

Still, Ernest H. Drew, president and chief executive officer, is not completely satisfied. Although sales volumes continue to improve, product prices do not, he says. In addition, export sales remain spotty, particularly to the European Economic Community, where economic recovery has been slow and where the Canadian dollar remains strong against major European currencies.

So far this year, Du Pont Canada has come back strong. It has turned last year's first-half $1.9 million loss into $12.5 million worth of black ink this year. Sales are up about 7%, but this recovery has been uneven. Weaknesses in mining, energy, and heavy construction markets have kept sales of explosives, polyethylene pipe, and industrial fibers down. On the other hand, products moving into automotive, housing, and consumer durables markets are doing well.

Although Canadian chemical companies have staged a comeback as far as sales and earnings are concerned, it really is only a start. Earnings, for instance, remain well below prerecession levels. And these companies now must move into the third quarter knowing that these three months bring with them a seasonal business slowdown.

Still, Canada's chemical leaders are optimistic, if not exuberant, about the remainder of the year. There is still enough uncertainty about the country's energy policies and its attitude toward the petrochemical industry to warrant exuberance.

*Earl Anderson, New York*

**Celanese Canada, Du Pont Canada turn losses to profits**

| | First-half 1983 | | | | | |
|---|---|---|---|---|---|---|
| $ Millions (Canadian) | Net sales | Change from 1982 | Net income[a] | Change from 1982 | Profit margin[b] 1983 | 1982 |
| C-I-L Inc. | $ 577.0 | −3.2% | $13.9 | −16.8% | 2.4% | 2.8% |
| Celanese Canada | 193.4 | 24.2 | 3.7 | c | 1.9 | def |
| Du Pont Canada | 546.5 | 6.8 | 12.5 | c | 2.3 | def |
| Union Carbide Canada | 326.7 | −8.4 | −9.0 | c,def | def | def |
| TOTAL | $1643.6 | 1.5% | $21.1 | 219.7% | 1.3% | 0.4% |

a Net income from continuous operations, excluding extraordinary gains or losses. b Net income as percentage of sales. c Deficit in 1982. def = deficit.